

CLAIMS:

1. An ultrasound imaging probe comprising:
a first ultrasound imaging transducer array subassembly having a first image field of view; and
a second ultrasound imaging transducer array subassembly having a second image field of view, the second ultrasound imaging transducer array subassembly being disposed at an angle greater than or equal to ninety degrees and less than or equal to one hundred eighty degrees ($90^\circ \leq \text{angle} \leq 180^\circ$) with respect to the first ultrasound imaging transducer array subassembly, wherein the second image field of view includes a portion thereof that is different from the first image field of view and wherein the first image field of view and the second image field of view together provide a combined image field of view.
2. The ultrasound imaging probe of claim 1, wherein the combined image field of view further includes a portion thereof in common with both the first and second image fields of view.
3. The ultrasound imaging probe of claim 1, wherein the second field of view overlaps with the first field of view in an image splice area.
4. The ultrasound imaging probe of claim 1, further comprising:
a housing, wherein the first and second ultrasound imaging transducer array subassemblies are disposed within the housing.
5. The ultrasound imaging probe of claim 4, wherein the first and second ultrasound imaging transducer array subassemblies are further disposed within the housing along a principal axis of the housing.
6. The ultrasound imaging probe of claim 4, wherein the first and second ultrasound imaging transducer array subassemblies are further disposed within the housing canted at an angle to a principal axis of the housing.
7. The ultrasound imaging probe of claim 1, wherein the first ultrasound imaging transducer array subassembly includes a flat matrix sensor assembly.
8. The ultrasound imaging probe of claim 7, further wherein the flat matrix sensor assembly includes an acoustic window coupled to a sensor stack, the sensor stack coupled to a flip chip ASIC, and the flip chip ASIC coupled to cabling interconnections.
9. The ultrasound imaging probe of claim 1, wherein the second ultrasound imaging transducer array subassembly includes a flat matrix sensor assembly.

10. The ultrasound imaging probe of claim 9, further wherein the flat matrix sensor assembly includes an acoustic window coupled to a sensor stack, the sensor stack coupled to a flip chip ASIC, and the flip chip ASIC coupled to cabling interconnections.

11. The ultrasound imaging probe of claim 1, wherein the first ultrasound imaging transducer array subassembly is responsive to transmit beamforming signals for transmitting sound energy into and receiving echo energy from the first field of view.

12. The ultrasound imaging probe of claim 1, wherein the second ultrasound imaging transducer array subassembly is responsive to transmit beamforming signals for transmitting sound energy into and receiving echo energy from the second field of view.

13. The ultrasound imaging probe of claim 1, wherein the ultrasound imaging probe includes a cylindrical probe having a principal axis along a length dimension of the probe.

14. The ultrasound imaging probe of claim 13, further wherein apertures of the first and second ultrasound imaging transducer array subassemblies facilitate a scanning direction perpendicular to the principal axis of the probe.

15. The ultrasound imaging probe of claim 1, wherein the ultrasound imaging probe includes one selected from the group consisting of an ultrasound imaging catheter and an intracavity probe.

16. The ultrasound imaging probe of claim 1, further comprising:

a third ultrasound imaging transducer array subassembly having a third image field of view, the third ultrasound imaging transducer array subassembly being disposed at an angle greater than or equal to ninety degrees and less than or equal to one hundred eighty degrees ($90^\circ \leq \text{angle} \leq 180^\circ$) with respect to the second ultrasound imaging transducer array subassembly, wherein the second image field of view includes a portion thereof that is different from the third image field of view, wherein together the first, second, and third image fields of view provide a combined field of view.

17. The ultrasound imaging probe of claim 16, further comprising:

a housing, wherein the first, second and third ultrasound imaging transducer array subassemblies are disposed within the housing.

18. The ultrasound imaging probe of claim 17, wherein the first, second and third ultrasound imaging transducer array subassemblies are further disposed within the housing along a principal axis of the housing.

19. The ultrasound imaging probe of claim 1, further comprising:

a housing, wherein the first and second ultrasound imaging transducer array subassemblies are disposed within the housing along a principal axis of the housing to provide the combined image field of view around a periphery of the housing; and

a third ultrasound imaging transducer array subassembly having a third image field of view, the third ultrasound imaging transducer array subassembly being disposed within the housing and canted at an angle with respect to the principal axis of the housing, wherein the third ultrasound imaging transducer array subassembly provides a forward looking image field of view ahead of the housing.

20. The ultrasound imaging probe of claim 19, still further comprising:

a fourth ultrasound imaging transducer array subassembly having a fourth image field of view, the fourth ultrasound imaging transducer array being disposed at an angle greater than or equal to ninety degrees and less than or equal to one hundred eighty degrees ($90^\circ \leq \text{angle} \leq 180^\circ$) with respect to the third ultrasound imaging transducer array, the fourth ultrasound imaging transducer array subassembly further being disposed within the housing and canted at an angle with respect to the principal axis of the housing, wherein the fourth image field of view includes a portion thereof that is different from the third image field of view and wherein the third image field of view and the fourth image field of view together provide a combined forward looking image field of view ahead of the housing.

21. The ultrasound imaging probe of claim 1, further comprising:

a third ultrasound imaging transducer array subassembly having a third image field of view;

a fourth ultrasound imaging transducer array subassembly having a fourth image field of view; and

a fifth ultrasound imaging transducer array subassembly having a fifth image field of view, the fifth ultrasound imaging transducer array subassembly being disposed at an angle greater than or equal to ninety degrees and less than or equal to one hundred eighty degrees ($90^\circ \leq \text{angle} \leq 180^\circ$) with respect to the fourth ultrasound imaging transducer array subassembly, the fourth ultrasound imaging transducer array subassembly being disposed at an angle greater than or equal to ninety degrees and less than or equal to one hundred eighty degrees ($90^\circ \leq \text{angle} \leq 180^\circ$) with respect to the third ultrasound imaging transducer array subassembly, the third ultrasound imaging transducer array subassembly being

disposed at an angle greater than or equal to ninety degrees and less than or equal to one hundred eighty degrees ($90^\circ \leq \text{angle} \leq 180^\circ$) with respect to the second ultrasound imaging transducer array subassembly, wherein the second image field of view includes a portion thereof that is different from the third image field of view, the third image field of view includes a portion thereof that is different from the fourth image field of view, the fourth image field of view includes a portion thereof that is different from the fifth image field of view, and the fifth image field of view includes a portion thereof that is different from the first image field of view, wherein together the first, second, third, fourth, and fifth image fields of view provide a combined field of view.

22. The ultrasound imaging probe of claim 21, wherein the combined field of view of the combined ultrasound image is on the order of approximately three hundred sixty degrees, oriented perpendicular to and about a principal axis of the probe.

23. The ultrasound imaging probe of claim 21, further comprising:

a housing, wherein the first, second, third, fourth, and fifth ultrasound imaging transducer array subassemblies are disposed within the housing along a principal axis of the housing.

24. The ultrasound imaging probe of claim 21, wherein the first, second, third, fourth and fifth ultrasound imaging transducer array subassemblies include flat matrix sensor assemblies.

25. The ultrasound imaging probe of claim 24, further wherein the flat matrix sensor assemblies each include an acoustic window coupled to a sensor stack, the sensor stack coupled to a flip chip ASIC, and the flip chip ASIC coupled to cabling interconnections.

26. The ultrasound imaging probe of claim 21, wherein the first, second, third, fourth and fifth ultrasound imaging transducer array subassemblies are responsive to transmit beamforming signals for transmitting sound energy into and receiving echo energy from the respective first, second, third, fourth and fifth fourth fields of view.

27. The ultrasound imaging probe of claim 21, wherein the ultrasound imaging probe includes a cylindrical probe having a principal axis along a length dimension of the probe.

28. The ultrasound imaging probe of claim 27, wherein apertures of the first, second, third, fourth and fifth ultrasound imaging transducer array subassemblies facilitate a scanning direction perpendicular to the principal axis of the probe.

29. The ultrasound imaging probe of claim 21, wherein the ultrasound imaging probe includes one selected from the group consisting of an ultrasound imaging catheter and an intracavity probe.

30. The ultrasound imaging probe of claim 1, further comprising:

a controller coupled to the first and second ultrasound imaging transducer array subassemblies for combining ultrasound imaging information received from the first and second ultrasound imaging transducer array subassemblies to produce data representative of a combined field of view ultrasound image.

31. The ultrasound imaging probe of claim 21, further comprising:

a controller coupled to the first, second, third, fourth and fifth ultrasound imaging transducer array subassemblies for combining ultrasound imaging information received from the first, second, third, fourth and fifth ultrasound imaging transducer array subassemblies to produce data representative of a combined field of view ultrasound image.

32. An ultrasound diagnostic imaging system comprising:

an ultrasound imaging probe, the ultrasound imaging probe including: a first ultrasound imaging transducer array subassembly having a first image field of view; and a second ultrasound imaging transducer array subassembly having a second image field of view, the second ultrasound imaging transducer array subassembly being disposed at an angle greater than or equal to ninety degrees and less than or equal to one hundred eighty degrees ($90^\circ \leq \text{angle} \leq 180^\circ$) with respect to the first ultrasound imaging transducer array subassembly, wherein the second image field of view includes a portion thereof that is different from the first image field of view and wherein the first image field of view and the second image field of view together provide a combined image field of view, and

a controller coupled to the first and second ultrasound imaging transducer array subassemblies for combining ultrasound imaging information received from the first and second ultrasound imaging transducer array subassemblies to produce data representative of a combined field of view ultrasound image.

33. The ultrasound diagnostic imaging system of claim 32, wherein the controller controls a scanning of elements of the first and second ultrasound imaging transducer array subassemblies, wherein scanning includes phasing elements with at least one selected from the group consisting of full and partial projection to an imaging target.

34. The ultrasound diagnostic imaging system of claim 32, wherein the controller controls a scanning of elements of the first and second ultrasound imaging transducer array subassemblies, wherein scanning includes scanning with only the array or portion of the array centered in a zone of interest within the combined field of view and overscanning at edges of the centered zone to permit averaging at an edge of the zone of interest and adjusting a gain of each array.
35. The ultrasound diagnostic imaging system of claim 32, further comprising:
means for splicing the first and second field of view images into the combined field of view image; and
display means for displaying the combined field of view image.
36. A method of fabricating an ultrasound imaging probe comprising:
providing a first ultrasound imaging transducer array subassembly having a first image field of view; and
coupling a second ultrasound imaging transducer array subassembly having a second image field of view to the first ultrasound imaging transducer array subassembly and being disposed at an angle greater than or equal to ninety degrees and less than or equal to one hundred eighty degrees ($90^\circ \leq \text{angle} \leq 180^\circ$) with respect to the first ultrasound imaging transducer array subassembly, wherein the second image field of view includes a portion thereof that is different from the first image field of view and wherein the first image field of view and the second image field of view together provide a combined image field of view.